



Facts about Cesium

Cesium was discovered by Robert Wilhelm Bunsen and Gustav Robert Kirchhoff, who in 1860 used Kirchhoff's novel chemical analysis approach, *spectroscopy*, to identify a new element.

Their identification was based upon two bright blue lines in the spectrum. The name caesium (from the Latin "caesius" - heavenly blue) was coined for its bright blue spectroscopic lines.

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Physical characteristics

Physically, cesium is a silvery gold metallic substance:

It is silvery gold, soft, and ductile. . . [Cesium] reacts explosively with cold water, and reacts with ice at temperatures above -116°C.

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Isotopes

There is only one naturally-occurring isotope of cesium, cesium-133 (Cs-133), along with a dozen *radioisotopes* (radioactive isotopes). Of these radioisotopes, Cs-137 is generated during nuclear fission, the splitting of uranium-235 in a nuclear reactor.

Health effects & precautions

Like other beta-emitters, Cs-137 is not an immediate health hazard for external exposures, but it decays to barium-137 (Ba-137) which, in turn, decays by emitting a highly-penetrating gamma ray that does pose an external hazard.

INEEL Oversight monitoring

Monitoring for cesium-137 is included in INEEL Oversight's Environmental Surveillance Program, with quarterly data reports on our findings available from our online library. (See http://www.oversight.state.id.us/ov_library/index.cfm#otd.)

Practical applications

A physical property of naturally-occurring Cs-133 is used to define the second, powering an atomic clock at the National Institute Standards and Technology (NIST) that is accurate to a second within twenty-million years.

The radioisotope cesium-137 has the following practical applications:

Cesium-137 and its decay product, barium-137m, are used for sterilization activities for food products, including wheat, spices, flour, and potatoes. Cesium-137 is also used in a wide variety of industrial instruments such as level and thickness gauges and moisture density gauges. Cesium-137 is also



commonly used in hospitals for diagnosis and treatment, as a calibration source, and large sources can be used to sterilize medical equipment.

"Common Radionuclides Found at Superfund Sites," EPA

Where can I learn more?

To learn more about cesium, see the following:

- Physical and chemical characteristics of cesium, along with a history of the element, can be viewed at webelements.com:
<http://www.webelements.com/webelements/elements/text/Cs/key.html>
- Learn more about the NIST-F1 Cesium Fountain Atomic Clock at:
<http://www.boulder.nist.gov/timefreq/cesium/fountain.htm>
- The Environmental Protection Agency's list of "Common Radionuclides Found at Superfund Sites:"
<http://www.epa.gov/superfund/resources/radiation/nuclides.htm>
- Argonne National Laboratory's fact sheet about cesium:
http://www.oversight.state.id.us/ov_library/Contaminant_Fact_Sheets/Cesium_FactSheet_ANL.pdf